REMARKS

The present Amendment amends claims 17-20. Therefore, the present application has pending claims 17-20.

35 U.S.C. §103 Rejections

Claims 17-20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Database Techniques for Archival of Solid Models* by McWherter, et al. ("McWhereter") in view of U.S. Patent Application No. 2002/0042697 to Yamada, et al. ("Yamada"). This rejection is traversed for the following reasons. Applicants submit that the features of the present invention, as now more clearly recited in claims 17-20, are not taught or suggested by McWherter or Yamada, whether taken individually or in combination with each other in the manner suggested by the Examiner. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

Amendments were made to the claims to more clearly describe features of the present invention. Specifically, amendments were made to the claims to more clearly recite that the present invention is directed to an analytical model preparing apparatus as recited, for example, in independent claim 17.

The present invention, as recited in claim 17, provides an analytical model preparing apparatus including a means for entering a shape model to be analyzed, a database that maps and registers each of a plurality of already prepared shape models with an analytical mesh model, a degree of approximation calculating means, and an analytical model preparing means. The degree of approximation calculating means includes a means for preparing associated information of shape elements by

comparing shape elements in the shape model to be analyzed with shape elements in the already prepared shape models, and associating the shape elements in the shape model to be analyzed with the shape elements in the already prepared shape models. The degree of approximation calculating means also includes means for calculating a degree of approximation of the shape elements of the already prepared shape models, based on the number of shape elements of the shape model to be analyzed associated with the associated information of the shape elements. The degree of approximation further means for displaying the already prepared shape models sequentially, from larger to smaller degrees of approximation on a display screen, and includes a means for selecting, in response to an instruction, at least one already prepared shape model from among the already prepared shape models displayed. The analytical model preparing means prepares an analytical mesh model of the shape model to be analyzed, by use of attribute information prepared for the analytical mesh model corresponding to the at least on already prepared shape model selected by the means for selecting, in accordance with the associated information of the shape elements between the shape elements in the shape model to be analyzed and the shape elements in the already prepared shape models. The prior art does not teach or suggest all of these features.

The above described features of the present invention, as now more clearly recited in the claims, are not taught or suggested by any of the references of record. Specifically, the features are not taught or suggested by either McWherter or Yamada, whether taken individually or in combination with each other.

McWherter teaches database techniques for the archival of solid models. However, there is no teaching or suggestion in McWherter of the analytical model preparing apparatus as recited in claim 17 of the present invention.

McWherter discloses techniques for managing solid models in modern relational database management systems. The goal of these techniques is to enable support for traditional database operations (sorting, distance metrics, range queries, nearest neighbors, etc.) on large databases of solid models. McWherter's techniques involve constructing a mapping from the boundary representation of a solid model to a graph-based data structure called a Model Signature Graph. The graphs are then projected into vector spaces, and distances between models based on the distances of their images in these spaces are examined. These distances become central elements in indexing and clustering of the solid models.

One feature of the present invention, as recited in claim 17, includes a degree of approximation calculating means, which includes a means for preparing associated information of shape elements by comparing shape elements in the shape model to be analyzed with shape elements in the already prepared shape models, and associating the shape elements in the shape model to be analyzed with the shape elements in the already prepared shape models. McWherter does not disclose this feature. For example, with reference to Fig. 1 and the text that accompanies Fig. 1, McWherter discloses a technique for the transformation from a solid model to a model signature to be used for database clustering. As shown and described, a mapping from the boundary representation of a solid model is constructed. This mapping is a graph-based data structure referred to as the Model

Signature Graph. Two alternative projections from the Model Signature Graph to vector spaces are developed, based on the semantic and structural properties in the graph. The object of this technique is to store a collection of CAD/CAM models in a database and to perform efficient search and retrieval of these models. In addition, the object is to cluster the collection of these models in order to extract information regarding the structure and distribution of the models in the database. These features of McWherter, of transforming from a solid model to a model signature to be used for database clustering and indexing, are quite different from preparing associated information, in the manner claimed. More specifically, McWherter's technique is not the same as preparing associated information of shape elements by comparing shape elements in the shape model to be analyzed with shape elements in the already prepared shape models, and associating the shape elements in the shape model to be analyzed with the shape elements in the already prepared shape models. McWherter, which is merely directed to archiving solid models in a relational database management system, does not teach or suggest preparing associated information of shape elements, by comparing shape elements of an input shape model with shape elements of shape models in a template, as claimed.

Another feature of the present invention, as recited in claim 17, includes where the degree of approximation calculating means includes a means for calculating a degree of approximation of the shape elements of the already prepared shape models, based on the number of shape elements of the shape model to be analyzed associated with the associated information of the shape elements. McWherter does not disclose this feature. As previously discussed, McWherter does

not teach preparing associated information of shape elements, in the manner claimed. Therefore, it follows that McWherter does not teach a means for calculating a degree of approximation based on the number of shape elements of the shape model to be analyzed associated with the associated information of the shape elements. Furthermore, as described in Section 3.2 (pages 81-82), McWherter merely discloses techniques of spectral graph theory as a basis for approximating graph similarity among model signature graphs. These techniques are used to approximate graph similarity among a set of template graphs. This is not the same as a means for calculating a degree of approximation of shape elements of the already prepared shape models based on the number of shape elements of the shape model to be analyzed associated with the associated information of the shape elements, in the manner claimed.

Yet another feature of the present invention, as recited in claim 17, includes an analytical model preparing means. The analytical model preparing means prepares an analytical mesh model of the shape model to be analyzed, by use of attribute information prepared for the analytical mesh model corresponding to the at least on already prepared shape model selected by the means for selecting, in accordance with the associated information of the shape elements between the shape elements in the shape model to be analyzed and the shape elements in the already prepared shape models. McWherter does not disclose this feature, and the Examiner does not rely upon McWherter for teaching this features. Furthermore, as previously discussed, McWherter does not disclose preparing associated information, in the manner claimed. Therefore, it follows that McWherter does not

teach preparing an analytical mesh model in accordance with the associated information.

Therefore, McWherter fails to teach or suggest "means for preparing associated information of shape elements by comparing shape elements in the shape model to be analyzed with shape elements in the already prepared shape models and associating the shape elements in the shape model to be analyzed with the shape elements in the already prepared shape models" as recited in claim 17.

Furthermore, McWherter fails to teach or suggest "means for calculating a degree of approximation of the shape elements of the already prepared shape models based on the number of shape elements of the shape model to be analyzed associated with the associated information of the shape elements," as recited in claim 17.

Even further, McWherter fails to teach or suggest "an analytical model preparing means for preparing an analytical mesh model of the shape model to be analyzed by use of attribute information prepared for the analytical mesh model corresponding to said at least one already prepared shape model selected by the means for selecting, in accordance with the associated information of the shape elements between the shape elements in the shape model to be analyzed and the shape elements in the already prepared shape models" as recited in claim 17.

The above noted deficiencies of McWherter are not supplied by any of the other references of record, namely Yamada, whether taken individually, or in combination with each other. Therefore, combining the teachings of McWherter and

Yamada in the manner suggested by the Examiner still fails to teach or suggest the features of the present invention as now more clearly recited in the claims.

Yamada teaches a method, apparatus and system for generating and analyzing a mesh for a shape model. However, there is no teaching or suggestion in Yamada of the analytical model preparing apparatus as recited in claim 17 of the present invention.

Yamada discloses the formation of a conventional mesh as sample in order to generate a high-quality mesh for a predetermined shape model. The mesh generation system of Yamada includes a mesh characteristic extraction unit for receiving a conventional mesh, and for extracting a characteristic from. The system further includes a mesh generator for receiving a target shape model for mesh generation, and for generating a mesh for the shape model, based on the characteristic of the conventional mesh extracted by the mesh characteristic extraction unit.

One feature of the present invention, as recited in claim 17, includes a degree of approximation calculating means, which includes a means for preparing associated information of shape elements by comparing shape elements in the shape model to be analyzed with shape elements in the already prepared shape models, and associating the shape elements in the shape model to be analyzed with the shape elements in the already prepared shape models. Yamada does not disclose this feature, and the Examiner does not rely upon Yamada for teaching a degree of approximation calculation means, as claimed.

Another feature of the present invention, as recited in claim 17, includes where the degree of approximation calculating means includes a means for calculating a degree of approximation of the shape elements of the already prepared shape models, based on the number of shape elements of the shape model to be analyzed associated with the associated information of the shape elements. Yamada does not disclose this feature, and the Examiner does not rely upon Yamada for teaching a degree of approximation calculating means, as claimed.

Yet another feature of the present invention, as recited in claim 17, includes an analytical model preparing means. The analytical model preparing means prepares an analytical mesh model of the shape model to be analyzed, by use of attribute information prepared for the analytical mesh model corresponding to the at least on already prepared shape model selected by the means for selecting, in accordance with the associated information of the shape elements between the shape elements in the shape model to be analyzed and the shape elements in the already prepared shape models. Yamada does not disclose this feature. For example, in paragraphs [0078] to [0081], Yamada discloses the processing performed by a mesh generation system. However, there is no teaching or suggestion in Yamada of an analytical model preparing means for preparing an analytical mesh model, in accordance with the associated information of the shape elements between the shape elements in the shape model to be analyzed and the shape elements in the already prepared shape models, in the manner claimed.

Therefore, Yamada fails to teach or suggest "means for preparing associated information of shape elements by comparing shape elements in the shape model to

be analyzed with shape elements in the already prepared shape models and associating the shape elements in the shape model to be analyzed with the shape elements in the already prepared shape models" as recited in claim 17.

Furthermore, Yamada fails to teach or suggest "means for calculating a degree of approximation of the shape elements of the already prepared shape models based on the number of shape elements of the shape model to be analyzed associated with the associated information of the shape elements," as recited in claim 17.

Even further, Yamada fails to teach or suggest "an analytical model preparing means for preparing an analytical mesh model of the shape model to be analyzed by use of attribute information prepared for the analytical mesh model corresponding to said at least one already prepared shape model selected by the means for selecting, in accordance with the associated information of the shape elements between the shape elements in the shape model to be analyzed and the shape elements in the already prepared shape models" as recited in claim 17.

Both McWherter and Yamada suffer from the same deficiencies, relative to the features of the present invention, as recited in the claims. Therefore, combining the teachings of McWherter and Yamada in the manner suggested by the Examiner does not render obvious the features of the present invention as now more clearly recited in the claims. Accordingly, reconsideration and withdrawal of the 35 U.S.C. §103(a) rejection of claims 17-20 as being unpatentable over McWherter in view of Yamada are respectfully requested.

The remaining references of record have been studied. Applicants submit that they do not supply any of the deficiencies noted above with respect to the references used in the rejection of claims 17-20.

In view of the foregoing amendments and remarks, Applicants submit that claims 17-20 are in condition for allowance. Accordingly, early allowance of claims 17-20 is respectfully requested.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of Mattingly, Stanger, Malur & Brundidge, P.C., Deposit Account No. 50-1417 (referencing attorney docket no. 389.41181X00).

Respectfully submitted,

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